E/ECE/324
E/ECE/TRANS/505 } Rev.2/Add.100/Amend.2

11 August 1998

AGREEMENT

CONCERNING THE ADOPTION OF UNIFORM TECHNICAL PRESCRIPTIONS FOR WHEELED VEHICLES, EQUIPMENT AND PARTS WHICH CAN BE FITTED AND/OR BE USED ON WHEELED VEHICLES AND THE CONDITIONS FOR RECIPROCAL RECOGNITION OF APPROVALS GRANTED ON THE BASIS OF THESE PRESCRIPTIONS */

(Revision 2, including the amendments entered into force on 16 October 1995)

Addendum 100: Regulation No. 101

Amendment 2

Supplement 2 to the original version of the Regulation - Date of entry into force: 14 May 1998

UNIFORM PROVISIONS CONCERNING THE APPROVAL OF PASSENGER CARS EQUIPPED WITH AN INTERNAL COMBUSTION ENGINE WITH REGARD TO THE MEASUREMENT OF THE EMISSION OF CARBON DIOXIDE AND FUEL CONSUMPTION AND OF CATEGORIES M1 AND N1 VEHICLES EQUIPPED WITH AN ELECTRIC POWER TRAIN WITH REGARD TO THE MEASUREMENT OF ELECTRIC ENERGY CONSUMPTION AND RANGE

UNITED NATIONS

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*/ Former title of the Agreement:

Agreement Concerning the Adoption of Uniform Conditions of Approval and Reciprocal Recognition of Approval for Motor Vehicle Equipment and Parts, done at Geneva on 20 March 1958.

GE.98- 22?77

Paragraph 4.4.1., footnote 2/, amend to read:

"2/ ..... 30 (vacant), 31 for Bosnia and Herzegovina, 32-36 (vacant), 37 for Turkey, 38-39 (vacant) and 40 for The former Yugoslav Republic of Macedonia. Subsequent numbers ..... to the Agreement Concerning the Adoption of Uniform Technical Prescriptions for Wheeled Vehicles, Equipment and Parts which can be Fitted and/or be Used on Wheeled Vehicles and the Conditions for Reciprocal Recognition of Approvals Granted on the Basis of these Prescriptions, ..."

Paragraph 5.2.4., amend to read:

"5.2.4. The appropriate reference fuel as defined in annex 9 of Regulation No. 83 must be used for testing.

For LPG and natural gas (NG) that reference fuel must be used which is chosen by the manufacturer for the measurement of the net power in accordance with Regulations No. 85. The chosen fuel must be specified in the communication document as defined in annex 2.

For the purpose of calculation mentioned in paragraph 5.2.3., the following fuel characteristics will be used:

(a) density: measured on the test fuel according to ISO 3675 or an equivalent method. For petrol and diesel fuel the measured density will be used; for LPG and natural gas a reference density will be used, as follows:

0.538 kg/litre for LPG
0.714 kg/m^3 for NG

(b) hydrogen-carbon ratio: fixed values will be usud which are:

1.85 for petrol
1.86 for diesel fuel
2.525 for LPG
4.00 for NG"

Annex 1,

Item 1.2.2., amend to read:

"1.2.2. Fuel: leaded petrol / unleaded petrol / diesel oil / LPG / NG 1/"

Insert new items 1.2.4.5. to 1.2.4.6.3.3., to read:

"1.2.4.5. By LPG fuelling system : yes/no 1/
1.2.4.5.1. Approval number according to Regulation No. 67 and documentation: . . . . . .
1.2.4.5.2. Electronic Engine Management Control Unit for LPG-fuelling:
1.2.4.5.2.1. Make(s): . . . . . .
1.2.4.5.2.2. Type: . . . . . .

1.2.4.5.3.3. Emission related adjustment possibilities: . . . . . .
1.2.4.5.3. Further documentation:
1.2.4.5.3.1. Description of the safeguarding of the catalyst at switch-over from petrol to LPG or back: . . . . . .
1.2.4.5.3.2. System lay-out (electrical connections, vacuum connections compensation hoses, etc): . . . . . .
1.2.4.5.3.3. Drawing of the symbol: . . . . . .

1.2.4.6. By NG fuelling system: yes/no 3/
1.2.4.6.1. Approval number according to Regulation No. 67: . . . . . .
1.2.4.6.2. Electronic Engine Management Control Unit for NG-fuelling:
1.2.4.6.2.1. Make(s): . . . . . .
1.2.4.6.2.1. Type: . . . . . .
1.2.4.6.2.2. Emission related adjustment possibilities: . . . . . .
1.2.4.6.3. Further documentation:
1.2.4.6.3.1. Description of the safeguarding of the catalyst at switch-over from petrol to NG or back: . . . . . .
1.2.4.6.3.2. System lay-out (electrical connections, vacuum connections compensation hoses, etc.): . . . . . .
1.2.4.6.3.3. Drawing of the symbol: . . . . . "

Annex 3.

Insert a new item 6.5.4., to read:

"6.5.4. In the case of LPG/NG 1/ the reference fuel used for the test (eg. G20, G25): . . . . . "

Items 6.5.4. to 6.5.6. (former), renumber as items 6.5.5. to 6.5.7.

Item 7.1.2., amend to read:

"....
7.1.2. Fuel consumption. 3/

....."

3/ Repeat for petrol and gaseous fuel in the case of a vehicle that can run either on petrol or on a gaseous fuel."

Annex 5,

Paragraph 1.4.3.3., amend to read:

".....
The dilution factor is calculated as follows:

For petrol and diesel: $$DF = \frac{13.4}{C_{CO_2} + (C_{HC} + C_{CO})\ 10^{-4}} \qquad (5a)$$

For LPG: $$DF = \frac{11.9}{C_{CO_2} + (C_{HC} + C_{CO})\ 10^{-4}} \qquad (5b)$$

For natural gas: $$DF = \frac{9.5}{C_{CO_2} + (C_{HC} + C_{CO})\ 10^{-4}} \qquad (5c)$$

where:
....."

Paragraph 1.5.2., amend to read:

"1.5.2. The fuel consumption, expressed in litres per 100 km (in the case of petrol, LPG or diesel) or in m^3 per 100 km (in the case of NG) is calculated by means of the following formulae:

(a) for vehicles with a positive ignition engine fuelled with petrol:

$$FC = (0.1154 / D) * [(0.866 * HC) + (0.429 * CO) + (0.273 * CO_2)]$$

(b) for vehicles with a positive ignition engine fuelled with LPG:

$$Fc_{norm} = (0.1212 / 0.538) * [(0.825 * HC) + (0.429 * CO) + (0.273 * CO_2)]$$

If the composition of the fuel used for the test differs from the composition that is assumed for the calculation of the normalised consumption, on the manufacturer's request a correction factor cf may be applied, as follows:

$$Fc_{norm} = (0.1212 / 0.538) * (cf) * [(0.825 * HC) + (0.429 * CO) + (0.273 * CO_2)]$$

The correction factor cf, which may be applied, is determined as follows:

$$cf = 0.825 + 0.0693 * n_{actual}$$

where:

n_{actual} = the actual H/C ratio of the fuel used

(c) for vehicles with a positive ignition engine fuelled with NG:

$$Fc_{norm} = (0.1336 / 0.654) * [(0.749 * HC) + (0.429 * CO) + (0.273 * CO_2)]$$

(d) for vehicles with a compression ignition engine:

$$FC = (0.1155 / D) * [(0.866 * HC) + (0.429 * CO) + (0.273 * CO_2)]$$

In these formulae:

FC = the fuel consumption in litre per 100 km (in the case of petrol, LPG or diesel) or in m^3 per 100 km (in the case of natural gas)

HC = the measured emission of hydrocarbons in g/km

CO = the measured emission of carbon monoxide in g/km

CO_2 = the measured emission of carbon dioxide in g/km

D = the density of the test fuel.
In the case of gaseous fuels this is the density at 15°C.